

**WHAT IS CLAIMED IS:**

1. A vibrating pumping stage for vacuum pumps, comprising:
  - a supporting base (15; 15');
  - a vibrating assembly (121; 221; 321) fastened to said supporting base (15; 15'), said
- 5 vibrating assembly comprising an active surface by which the deflection of the molecules of surrounding gas is caused during vibration of said vibrating assembly; and
  - a control device (21) placed onto said supporting base (15; 15') to make said vibrating assembly vibrate and consequently cause deflection of said gas molecules.
- 10 2. The vibrating pumping stage as claimed in claim 1, wherein said supporting base (15; 15') comprises a silicon wafer.
3. The vibrating pumping stage as claimed in claim 2, wherein said control device (21) is placed between said supporting base (15; 15') and said vibrating assembly (121; 221; 321).
- 15 4. The vibrating pumping stage as claimed in claim 3, wherein said control device (21) is an electrode and wherein a variable electric field is applied between said electrode and said vibrating assembly to cause vibration of said vibrating assembly with respect to said supporting base.
- 20 5. The vibrating pumping stage as claimed in claim 4, wherein said electric field is generated by a sinusoidal signal and said sinusoidal signal has a frequency close to the resonance frequency of said vibrating assembly.
- 25 6. The vibrating pumping stage as claimed in claim 5, wherein a cavity (13) housing said electrode is formed in said supporting base below said vibrating assembly.
7. The vibrating pumping stage as claimed in claim 6, wherein said vibrating assembly is a planar resilient membrane.
- 30 8. The vibrating pumping stage as claimed in claim 7, wherein said membrane is substantially rectangular and is fastened to said supporting base at its ends (123a, 123b) corresponding to the minor sides of said rectangle.

9. The vibrating pumping stage as claimed in claim 7, wherein said membrane is substantially H-shaped and is fastened to said supporting base at its four ends (223a, 223b).

10. The vibrating pumping stage as claimed in claim 9, wherein said membrane is fastened  
5 to said supporting base along a peripheral rim (17) surrounding said cavity (13), whereby said membrane is suspended above said cavity.

11. The vibrating pumping stage as claimed in claim 10, wherein said membrane comprises a side extension (125) partly overlapping said peripheral rim so as to define a corresponding first  
10 contact area (127), and wherein said electrode comprises a side extension (23) such that the electrode partly overlaps the peripheral rim (17) of said supporting base (15) so as to define a corresponding second contact area (27).

12. The vibrating pumping stage as claimed in claim 11, wherein said sinusoidal signal is  
15 applied to said first and second contact areas to generate a variable electric field between said vibrating assembly and said control device, said electric field causing vibration of said assembly.

13. The vibrating pumping stage as claimed in claim 4, wherein said vibrating assembly comprises a rigid membrane (331) supported by resilient members or suspension springs (333),  
20 placed between said membrane (331) and said supporting base, said resilient members being fastened to said supporting base.

14. The vibrating pumping stage as claimed in claim 13, wherein said membrane and said supporting base have a substantially parallelepipedal rectilinear shape.  
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15. The vibrating pumping stage as claimed in claim 14, wherein said resilient members are S-shaped.

16. The vibrating pumping stage as claimed in claim 14, wherein said membrane has  
30 openings (329) to form a sufficiently rigid trellis structure making the membrane vibrate substantially parallel to the plane on which it lies in idle conditions.

17. A molecular vacuum pump comprising:  
a cylindrical casing (51) having a gas inlet port (53a) and an outlet port (53b),

5        said casing housing at least one disc-shaped vibrating pumping set,  
      said pumping set comprising at least one vibrating pumping stage,  
      said at least one vibrating pumping stage having a supporting base (15; 15'); a vibrating  
assembly (121; 221; 321) fastened to said supporting base (15; 15'), and a control device (21)  
      placed between said supporting base (15; 15') and said vibrating assembly (121; 221; 321).

18.        A molecular vacuum pump as claimed in claim 17, wherein said at least one disc-shaped  
pumping set comprises a plurality of vibrating pumping stages.

10        19.        A molecular vacuum pump as claimed in claim 18, wherein said disc-shaped vibrating  
pumping set (55) is placed perpendicular to the axis of the cylindrical casing (51), and wherein a  
free annulus is provided between said disc-shaped vibrating pumping set and said casing for gas  
passage.

15        20.        A molecular vacuum pump as claimed in claim 19, wherein said casing is a non-  
rectilinear duct for gas flow.